

REASONS FOR THE EARLY TREATMENT OF SQUINT

By M. F. WEYMANN,* M. D., Los Angeles

The treatment of squint should begin as soon as the squint is discovered, and the reasons for this are based upon sound physiological principles.

DISCUSSION by George H. Kress, Los Angeles; Otis Allen Sharpe, San Francisco; J. R. and G. W. Walker, Fresno.

MY PURPOSE is not to go into the details of the treatment of patients suffering from squint, but to cite the underlying principles upon which early treatment is rationally indicated. I shall consider only non-paralytic squint, which is not due to lues, cerebral hemorrhage, or any other definite pathological entity.

In the beginning man developed binocular vision through the peculiar quality of a fusion sense, which sense is not present in the lower animals. Even in man it is not developed at birth, but is gradually assumed during the first years of life. Especially during the first year of infancy does this sense gain a foothold, and it is gradually strengthened during succeeding years until when the child is 7 or 8 years of age the sight of one eye may be lost and both eyes will still move synchronously because the muscles have become accustomed to co-ordination through fusion of the images. Mothers often claim that their infants look "cross-eyed" now and then. This is because they have not yet developed the fusion sense sufficiently to avoid some inco-ordination in movement of the eyes.

FUSION SENSE DEFINED

The impulses set up by images thrown upon the retina are transferred to the occipital cortex and there fused into one by the fusion sense, this being done to prevent one from seeing two objects where there is really one. But to fuse these images it is necessary that they be as nearly alike as possible, and to this end the eye muscles are co-ordinated to focus the two eyes upon the same object at the same time. When this is not done, double vision and discomfort result. Thus it is the fusion sense which prevents the discomfort of double vision, and this is accomplished by the desire for fusion of images causing the ocular muscles to work in harmony and give one "straight eyes."

But in infancy, when the fusion sense is weak or immature, certain factors may hinder its complete development. And these factors act more powerfully in the case of those infants with an inherently weak fusion sense than in those with a strong one. For it seems that the fusion sense varies in individuals just as does their resistance to infection.

One of the factors which would cause difficulty in the fusion of the images of the two eyes would be a clear image in the one eye and a distorted image in the other. That is, if one eye were highly near-

sighted, farsighted, or astigmatic, and the other eye normal, the two images would be dissimilar and difficult to fuse. Thus, an individual with a weak fusion sense would have difficulty with double vision, and to rid himself of this discomfort would unconsciously cause the abnormal eye to cross so as to make its image completely different and then suppress the image of the crossing eye entirely in the brain. Such a person would really have monocular vision and would be "brain blind" to the image in the crossing eye. As said before, this occurs as an unconscious act to relieve the individual of the discomfort of double vision, and is an easier alternative than to try to fuse the two dissimilar images.

In a child born farsighted in both eyes there is another factor working to hinder the fusion sense and to cause the eyes to become crossed. Normally, an individual, when looking at distant objects, is using no muscular effort in focusing, that is, the focusing apparatus is at rest, and there is very little convergence of the two eyes upon the object. But when such an individual looks at a close object the eyes must not only be focused upon it as one focuses a camera, but must be converged upon it as well. So that any impulse stimulating the ciliary muscle or focusing apparatus must stimulate the internal recti muscles to converge the eyes upon the object at the same time. Now if a child is very farsighted he must not only focus for near objects, but must keep up a constant stimulus to the focusing apparatus to be able to see distant objects distinctly. This stimulus also affects the muscles of convergence and, unless the fusion sense is strong enough to overcome this tendency toward convergence, the eyes will turn in more than necessary, with the resulting formation of two dissimilar images and double vision. To avoid the discomfort of the double vision one eye will be allowed to turn far in and its image will be disregarded. Thus, a convergent strabismus will be produced, and the child will have monocular vision.

The child who is nearsighted has a similar condition to cope with, but here the stimulus to convergence is lessened and the eye usually turns out instead of in. It does not follow that all divergent squints are myopic, and vice versa, but that is the general rule.

As a result of the crossing of one eye and the disregardance of its image by the brain, we have one of the most serious complications of the neglected squint patient. If the eye of an infant is covered at birth, or if it is unconsciously thrown into disuse by crossing, as noted above, the visual acuity of that eye does not develop and it remains amblyopic or partially blind throughout life if the period of disuse is long enough continued. Therefore, if a child whose eyes are crossed is allowed to go untreated until 4, 5, or 6 years of age the vision of the crossing eye is permanently impaired. But if the child can be made to use the crossing eye as soon as possible after the crossing is definitely established, the chances for a return to normal vision of that eye are directly proportional to the earliness with which the treatment is begun.

No child over 2 years of age is too young to wear glasses, and many can wear them under this age

*M. F. Weymann (418 Westlake Professional Building, Los Angeles), M. D. Washington University Medical School, St. Louis. Practice limited to ophthalmology. Hospital connections: Los Angeles General Hospital, Los Angeles Eye and Ear Hospital, Hollywood Hospital. Appointments: Ophthalmologist Post-graduate school, University of California. Publications: Microphthalmos With Cyst (Amer. Jour. Ophthalmology), Mercurochrome 220 in Ophthalmic Therapeutics (California and Western Medicine).

if necessary. An oculist who gives as his only excuse for not treating a case of squint that the child is too young for glasses indicates that he does not care to take the trouble for the examination of the child. Of course, there are some cases of squint where glasses are not necessary, and the oculist may say so after an examination, but the reason for not prescribing glasses should not be the age of the child.

The refraction should be done under atropin and a careful retinoscopic examination made. If the child is old enough to name pictures, the subjective tests should be used as a check. Correction with glasses, where one eye is normal and the other ametropic, tends to make the images of the two eyes more alike and more easily fusible. In the cases of farsightedness they remove the extra stimulus to convergence, and in nearsightedness tend to increase this stimulus. Therefore, myopic divergent strabismus patients and hyperopic convergent strabismus patients are given as much correction as possible, while patients with myopia and convergent squint, and vice versa, are given only their astigmatic correction and exercises for developing the fusion sense.

After proper glasses have been provided, the crossing eye should be made to work by bandaging the good eye daily during waking hours for a month. Then both eyes are used for a few days, and the covering of the good eye repeated. This will not cause a diminution of visual acuity in the good eye, for when once acute vision is developed in the eye of a child it will not be affected by a few months' occlusion of that eye, and in an adult the eye may be covered for years without the loss of visual acuity. Many adults with cataract go for ten or more years with the opaque lens covering an eye, and upon its removal are restored to practically normal vision. But in the infant under 1 or 2 years of age the disuse of an eye for a short length of time means a permanent loss of visual acuity. Where the parents cannot be trusted to cover the good eye it may be put under the influence of atropin. This is not as good as covering it, but it makes the child use the crossing eye for all close work, or about two-thirds of the time. When the vision of the crossing eye no longer shows any improvement, or when the strabismus becomes alternating, this measure is discontinued. If this treatment is begun when the child is about 2 years of age the vision of the crossing eye may return to normal, but in older children, although it will be improved, it rarely comes back to normal. Even children of 6 years of age and over show marked improvement, as evidenced by one child of 6 years, and whose vision in the crossing eye under the treatment of bandaging the good eye for two months improved from 20/240 to 20/30.

The other item in the treatment of these patients is the exercise of the fusion sense. This is done by means of the Worth amblyoscope, which is an arrangement of prisms and tubes, so adjusted as to allow the cross-eyed individual to see two cards at the same time and to try to fuse the pictures on the cards. For example, one card will be the picture of a bird and the other a cage, the object being to

get the child to see the bird in the cage, or to superimpose the images in the brain.

Very nearly all cases of squint can be cured in this manner if seen early enough. But if the child is allowed to grow older before instituting treatment, the results are not nearly so good. Even if the eyes are straightened by operative procedure the chances of restoring binocular vision are much diminished in the older child. Under no condition is operative treatment to be advised until all of the above measures have been tried and until there has been no further improvement under this treatment in a period of three to six months.

When operation is done it should not be tenotomy of the overacting muscle. If tenotomy is necessary, in addition to advancement of the underacting muscle, which latter operation is that of choice, it should be regulated by setting the tendon back a definite amount and suturing it to the sclera. Otherwise, there is the danger of a later strabismus in the opposite direction. But my purpose is not to go into the details of technical procedure.

In conclusion, I can only repeat that, for the best welfare of the patient, the treatment of squint should begin as soon as the squint is discovered, and the reasons for this are based upon sound physiological principles.

DISCUSSION

GEORGE H. KRESS, M. D. (Bradbury Building, Los Angeles)—What Doctor Weymann has so admirably outlined as the proper procedures in treating children with squint cannot be overemphasized.

The heartache of the child as it reaches the age when the stigma of being "cross-eyed" comes home to it, the distress of family and friends, and even the discomfort of strangers who come into contact with a pair of "cross-eyes," should long before now have educated both the medical profession and the laity to the foundation principles that are involved in crossed eyes and their rational eradication. Not infrequently, however, even today, one sees patients where not only the parents, but the attending physicians are not without blame.

Weymann's introduction of the subject most lucidly explains the physiological principles involved in the development of "crossed eyes" and of the partial blindness which usually involves the eye which is off its proper axis.

It is unfortunate that so many of the laity, and worse still, that some physicians seem to feel that the wearing of glasses in early childhood will "weaken" the child's eyes. It cannot be too often repeated that when an eye begins to squint a continuation of the squinting can only lead to disaster to such an eye, both from the visual acuity and cosmetic standpoints.

The indications for the treatment of a developing squint in early childhood are very clear. They are those that are outlined by Weymann in his paper. They may be summed up in the words, "proper glasses and proper eye exercises." When these are instituted early, a very considerable amount of the visual acuity that otherwise might be lost in a shockingly short space of time, because of the discomfort incident to double vision in the child, may be conserved for both child and adult life. And, likewise, a very considerable portion of what is little less than heart-breaking cosmetic deformity can be prevented from developing.

Let all of us who are physicians thoroughly appreciate the fact that we do a child-patient that is developing a squint a gross injustice if we fail to tell the parents that the child should be seen early by a competent oculist, so that the pathology and refractive errors may be determined and the proper treatment started. In this trouble, as in some phases of law, "Time is part of the essence

of the contract." Let us be alert to our responsibilities when such patients come to us, and promptly advise the parents of the nature and consequences of squint when the condition is neglected.

OTIS ALLEN SHARPE, M. D. (Flood Building, San Francisco)—This subject has been very capably and efficiently discussed by Doctor Weymann. Too much cannot be said in regard to urging parents who have children with squinting eyes to have them attended to early, as in most cases the squinting eye very soon loses a good part of its vision, and in a few years will lose all the useful vision, which cannot be brought back except by many tedious hours of work on the part of the parents and discomfort and fretting on the part of the child. Therefore, I urge very strongly encouraging the parents to bring the child early and have a careful refraction under atropin mydriasis. It is little less than a crime to allow a child to grow up with such a deformity as "crossed eyes" when such a condition can be handled so very efficiently if taken early.

There is much in commendation to be said about the work which is now being done in the school department of the larger cities, in examining carefully the eyes of all children as soon as they enter school, and furnishing the right correcting lenses to those needing them.

Also a word should be said about those cases which should be operated. There are certain cases (the particular kind I will not take the time to discuss here) which can never be corrected merely with the use of glasses. These eyes should be operated early. If they are not, the seeing power will not be developed even with the correct lenses. To my mind it is a worse neglect to allow these children to grow into adults with defective eyes than it is to allow the existence of some other deformity, such as that of a leg or arm, which might be corrected.

Also I wish to say a few words in regard to correcting deviating eyes, from the purely cosmetic standpoint. There is a common belief among many eye surgeons that very amblyopic eyes cannot be successfully operated. I have had the opportunity of doing experimental operations upon a great many such eyes, and find that a large percentage can be successfully operated. It may take several operations to get the desired result, but it can be done and should be done whenever and wherever a person's personal appearance can be improved.

J. R. and G. W. WALKER, M. D. (Rowell Building, Fresno, California)—Dr. Weymann has written an admirable paper. If parents are shown that the crossed eye is not at all used—that the child is certainly losing the vision in one eye—they will become keenly alive to following the oculist's suggestions. Certainly, a child is not too young to wear glasses at 2 years, and no one, oculist or family physician, must ever be guilty of advising to wait for the child to grow out of it. They are growing blind or at least sped in that direction. Refraction under mydriatic, supplemented by fusion development, as Weymann suggests, straightens nearly all eyes, and not only straightens, but makes the child change from a one-eyed person to one possessed of two useful eyes, giving the enlarged field and other advantages and a reserve if the straight eye should be lost later in life from some cause.

Simply a beautiful surgical straightening of an eye, commendable though it is, does not often give a good eye where amblyopia previously existed. We have in mind a young man whose crossed eye had been nicely straightened at 23 surgically, who at 24 lost the other one from a wound, and who never did regain vision sufficient to make him able to walk the street. The time to begin treatment of the cases of squint, Weymann includes, is as soon as the case is diagnosed.

Correctly fitted glasses do no damage to any eye at any age. We can only emphasize what Dr. Weymann has said.

DOCTOR WEYMAN (closing)—Doctor Kress has not emphasized any too strongly the embarrassment which these squinting children suffer through the ridicule of their playmates. If, as Doctor Sharpe has said, the eyes do not improve through the regular measures, or if the child is seen after the eye is markedly amblyopic, we should not hesitate to operate, even if the result to be gained is only the cosmetic one. The patient should be told in advance that more than one operation may

be necessary in order that he may not be disappointed if the first procedure does not correct the entire defect. But if we are to gain both the cosmetic effect, and what is most important, good binocular vision, we must get these patients under treatment early. This is well illustrated by the report of Doctor Walker's patient.

RADIOTHERAPY OF NON-MALIGNANT CONDITIONS

By FRANCIS WILLIAMS,* M. D., San Francisco

PHYSICIANS, and to some extent people in general, are conversant with the value of radiotherapy in malignancy, and know something of its field of usefulness and the limitations of that field—but I find that some physicians even are scarcely aware of the value of radiotherapy in non-malignant conditions.

During the past eight years I have applied x-ray, radium, quartz light, and electrotherapy to the problems of general office practice, which has afforded opportunity for testing some current and published teachings. From such general experience one gradually comes to rely on certain agents, while rejecting others. Yet, one realizes that other experienced workers often succeed remarkably with the agents we reject, and may reject some agents on which we rely.

To this preface a foreword may be added, explaining the action of short-wave radiation on the tissues treated. The body tissues react in at least three ways:

Small Dosage—5 to 25 m. a. minutes—"the ionizing dose," is stimulating to the cellular elements concerned in repair, such as the histocytes and leucocytes; such is the useful dosage in bone tuberculosis, in which condition depressing effects must be carefully avoided. Sampson specifies the "ionizing dose" to be 5 m. a. minutes, delivered with a 5½-inch gap through 1 mm. of Al.

Heavy Dosage—50 to 100 m. a. minutes and up—exerts a destructive action on massed cellular products of inflammation, such as leucocytes, plasma and giant cells, hence is efficient in aiding absorption of infective granuloma, carbuncles, and infected cervical glands.

Large Dosage also acts by affecting the lining endothelium of the vessels supplying the pathologic condition under treatment; such is the manner in which uterine fibroid is reduced. To the above three actions of radiation may be added the formation of fibrous tissue from reduced cells, and the systemic reaction which causes beneficial results at a distance from the area directly treated.

In addition it is important to ascertain what wave length gives the best selective action on each group of pathologic conditions, and by choice of filters select rays of approximate homogeneity; this is the most difficult field of radiotherapy, if one may judge by the varied techniques found in current medical

*Francis Williams (1220 Flood Building, San Francisco), M. D. College of Physicians and Surgeons, San Francisco. Interne, assistant visiting physician and assistant visiting surgeon, San Francisco Hospital, 1900-1906. Practice limited to radiology and office treatment. Hospital connections: San Francisco Hospital, 1900-1906; Fairmont Hospital, 1915-1920. Appointments: Professor of Physiology and Embryology, College of Physicians and Surgeons, San Francisco, 1903-1908.